

WHAT IS CLAIMED IS:

1. An apparatus for testing a coating fluid for runnability, the fluid having surface tension, viscosity, elasticity and dilatant behavior which influence the stretch of the fluid, the apparatus comprising:

a pressurized container adapted for receiving a quantity of the coating fluid, the container having an outlet arrangement;

the outlet arrangement comprising a tube and flow rate regulating means for regulating a flow rate of the fluid through the tube, the tube having an opening for discharging the fluid which falls under the influence of gravity, the flow rate regulating means being operated to adjust the flow rate of the fluid until a continuous, ripple-free stream of the fluid leaves the opening; and

flow rate measuring means for measuring a minimal flow rate at which the fluid leaves the opening in the continuous, ripple-free stream, the runnability and stretch being a function of the measured minimum flow rate.

2. An apparatus according to claim 1, wherein the opening of the tube has a diameter of about 0.011" to about 0.034".

3. An apparatus according to claim 2, wherein the opening of the tube has a diameter of about 0.015" to about 0.030".

4. An apparatus according to claim 1, including means for supplying air to the container to pressurize the container.

5. An apparatus according to claim 4, wherein the means for supplying air comprising a storage tank of air connected to the container via an air tube and an air-pressure valve.

6. An apparatus according to claim 1, wherein the flow rate measuring

means comprises a graduated volume below the tube opening for receiving the fluid leaving the opening and a time measuring device for measuring the time it take for the fluid to fill a selected part of the volume.

7. An apparatus according to claim 1, wherein the flow rate regulating means comprises a needle valve in the tube.

8. An apparatus according to claim 1, wherein the flow rate measuring means comprises a flow meter.

9. An apparatus according to claim 1, wherein the tube has a tapered end with a knife-edge forming said opening for discharging the fluid which falls under the influence of gravity.

10. An apparatus for testing a coating fluid for runnability, the fluid having surface tension, viscosity, elasticity, and dilatant behavior which influence the falling acceleration of the fluid under the influence of gravity, the apparatus comprising:

a pressurized container adapted to receive the fluid, the container having an outlet opening;

means for regulating a flow rate of the fluid through the outlet opening for creating a continuous stream of fluid falling from the outlet opening under the influence of gravity;

air nozzle means for blowing a stream of gas at the continuous stream at each of two different heights for deflecting the continuous stream at each of the two different heights by an angle that is proportional to a velocity times flow rate or momentum of the continuous stream, at each respective height, the air nozzle means comprising two air nozzles spaced vertically from each other and each nozzle spaced a known horizontal distance from the continuous stream; and

means for calculating the acceleration of the continuous stream as a

function of the velocity of the continuous stream at the two different heights and the distance between the two different heights.

11. A method for measuring coating fluid runnability which is related to stretch and combined effects of surface tension, viscosity, elasticity and dilatant behavior of the fluid, the method comprising the steps of:

- loading a container with a quantity of the fluid;
- pressurizing the container;
- releasing the fluid from an outlet tube opening of the container to fall from the opening at a flow rate;
- regulating the flow rate so that the fluid forms into a continuous stream from the opening; and
- measuring a minimal flow rate at which the fluid leaves the opening in the continuous stream, the runnability and stretch being a function of the measured minimum flow rate.

12. A method according to claim 11, including pressurizing the container with air.

13. A method according to claim 12, wherein the minimal flow rate is established by increasing an initial flow rate of a series of drops with coarse and fine adjustment until the fluid transforms into the continuous stream.

14. A method for measuring the acceleration of a fluid, comprising:

- loading a container with a fluid;
- pressurizing the container;
- releasing a continuous stream of the fluid from an outlet of the container at a flow rate to form a continuous stream of the fluid;
- horizontally deflecting the continuous stream of the fluid by blowing first

and second air flows at the continuous stream, the first and second air flows being directed at two different heights along the continuous stream and deflecting the continuous stream at each height by a deflection angle proportional to the velocity times the flow rate or the momentum of the continuous stream at each height; and

calculating the acceleration of the stream as a function of the velocity of the stream at the two different heights and the spacing between the two different heights;

the first and second air flows being provided by nozzle means for directing air at a known horizontal force at each of the two different heights, the nozzle means comprising two vertically spaced apart air nozzles positioned at known horizontal distances from the continuous stream.

15. An apparatus for testing a coating fluid for runnability, the fluid having surface tension, viscosity, elasticity and dilatant behavior which influence the falling acceleration of the fluid under the influence of gravity, the apparatus comprising:

a pressurized container adapted to receive the fluid, the container having an outlet;

the outlet comprising a tube with an opening and means for regulating a flow rate of the fluid through the tube and out the opening for creating a continuous stream of fluid falling from the opening under the influence of gravity;

air nozzle means for blowing a stream of gas at the continuous stream at a known distance from the outlet, the stream of gas for deflecting the continuous stream at an angle that is proportional to a velocity times flow rate or momentum of the continuous stream; and

means for calculating the acceleration of the continuous stream as a function of the velocity of the continuous stream.

16. An apparatus according to claim 15, wherein the air nozzle means

comprises a single air nozzle.

17. An apparatus according to claim 15, including means for supplying air to the container which comprises a storage tank of air connected to the container via an air tube and an air-pressure valve.

18. An apparatus according to claim 15, including a volume measuring device and a time recording device for measuring the flow rate of the fluid from the tube opening.

19. A method for measuring the acceleration of a fluid, comprising:

loading a container with a fluid;

pressurizing the container;

releasing a continuous stream of the fluid from an outlet of the container at a flow rate to form a continuous stream of the fluid;

horizontally deflecting the continuous stream of the fluid by blowing an air flow at the continuous stream at a known height and deflecting the continuous stream by a deflection angle proportional to the velocity times flow rate or momentum of the continuous stream at the known height; and

calculating the acceleration of the stream as a function of the velocity of the stream.

20. A method according to claim 19, including pressurizing the container with air.

21. A method according to claim 19, wherein the flow rate is established by increasing an initial flow rate of a series of drops of the fluid from the outlet until the fluid transforms into a continuous falling stream.